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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/518,638	11/21/2005	Jean-Yves Cavaille	032013-109	5360

23911 7590 11/26/2010

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EXAMINER	
DOUYETTE, KENNETH J	

ART UNIT	PAPER NUMBER
1725	

MAIL DATE	DELIVERY MODE
11/26/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/518,638	CAVAILLE ET AL.
	Examiner	**Art Unit**
	KENNETH DOUYETTE	1725

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 October 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-7 and 9-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-7 and 9-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/21/2010 has been entered.

Response to Amendment

2. Claims 1, 3-7 and 9-36 are pending in the application.

3. New grounds of rejection have been introduced.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1, 3-6, 9-13, 18, 20-22, 26, 31 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Callahan et al. (US 2002/0010261) in view of Leesona (GB 1,160,084).

Regarding claim 1, Callahan et al. discloses an ionic conduction material comprising a polymer matrix ([0020]), at least one ionic species ([0020]) and at least one reinforcing agent ([0064]), wherein:

- the polymer matrix ([0020]) is a solvating polymer ([0021]) optionally having a polar character (“charge transfer compounds”, [0065]);
- the ionic species ([0020]) is an ionic compound selected from salts and acids ([0064]), said compound being in solution ([0064]) in the polymer matrix ([0020]);
- the reinforcing agent is a cellulosic material ([0064]).

Callahan et al. does not disclose the reinforcing material is comprised of cellulose single crystals or of cellulose microfibrils nor that the polymer matrix is comprised of a solvating polymer having a polar character and wherein a reinforcing agent network is formed in the material from the reinforcing agent being brought into contact with the polymer.

Leesona discloses a support for an electrode (P5/C1/L35-37) including cellulosic (P3/C1/L5-7) microfibers (P4/C1/L45-48) brought into contact with (P3/LC1/L5-39) a polymer matrix including a charge (P2/C1/L55-60) forming a reinforcing network enhancing the mechanical strength and overall construction of an electrode (P1/C1/L39-41, P5/C1/L35-37).

Leesona and Callahan et al. are analogous since both deal in the same field of endeavor, namely, polymer materials for electrodes.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the cellulosic microfibers in contact with a polymer matrix as disclosed by Leesona into the material composition of Callahan et al. to enhance the mechanical strength and overall construction of an electrode onto which the material composition is disposed.

Regarding claim 3, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the proportion of reinforcing agent is between 0.5% and 70% by weight ([0064]).

Regarding claim 4, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the proportion of reinforcing agent is between 1% and 10% by weight ([0064]).

Regarding claim 5, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the polymer matrix is comprised of a crosslinked ([0021]) or non-crosslinked solvating polymer ([0021]).

Regarding claim 6, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the solvating polymer ([0021]) carries grafted ionic groups ([0054], [0055], [0056]).

Regarding claim 9, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the polymer matrix ([0020]) is comprised of a mixture of solvating ([0021]) polymers and at least one aprotic polar liquid (“unsaturated amide”, [0063]).

Regarding claim 10, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the aprotic polar liquid (“unsaturated amide”, [0063]) is an amides ([0063]).

Regarding claim 11, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the polymer is a non-solvating polymer selected from the .qroup consistinq of polymers which have polar groups (“anionic polysulfone”, [0064]) and which comprise units containing at least one heteroatom containing sulfur ([0064]).

Regarding claim 12, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the ionic compound is selected from the qroup consistinq_of strong acids (“perchloric acid”, [0027]) and from salts of alkali metals (“KOH”, [0077]).

Regarding claim 13, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the ionic compound is selected from the qroup

consistinq of phosphoric acid (“perchloric acid”, [0027]), and from salts of said acids ([0064]).

Regarding claim 18, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses an electronically conductive material (“conductive glass”, [0029]) and an active material (“platinum”, [0044]) performing as a catalyst (“inert”, [0044]).

Regarding claim 20, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the active material is platinum ([0044]) or a platinum alloy.

Regarding claim 21, modified Callahan et al. discloses an electrode for a fuel cell ([0022]), comprising a composite material ([0044]) as set forth above.

Regarding claim 22, modified Callahan et al. discloses an electrolyte for a lithium-polymer battery ([0042]), in which the negative electrode (“anode”, [0043]) is comprised of metallic lithium ([0043]), and a material ([0046]) as set forth above.

Regarding claim 26, modified Callahan et al. discloses an electrolyte of a membrane fuel cell ([0022]), comprised of an ionic conduction material ([0020]) as set forth above.

Regarding claim 31, modified Callahan et al. discloses an electrochromic glazing ([0016]) comprising two electrodes ([0017]) separated by an electrolyte ([0017]), wherein the electrolyte is an ionic conduction material ([0020]) as set forth above in which the ionic compound is an acid ([0021]).

Regarding claim 35, modified Callahan et al. discloses an electrode for a fuel cell ([0022]), comprising a composite material ([0020]), wherein the composite material ([0020]) is a material as set forth above.

6. Claims 7, 23, 27-28 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Callahan et al. (US 2002/0010261) in view of Leesona (GB 1,160,084) as applied to claim 1 above and further in view of Armand et al. (US 2002/0013381).

Regarding claims 7 and 27-28, Callahan et al. discloses all of the claim limitations as set forth above but does not disclose polymer matrix is comprised of a non- solvating polymer carrying acidic ionic groups, wherein the non-solvating polymer carries alkylsulfonic groups or arylsulfonic groups or perfluorosulfonic groups or perfluoro-carboxylic groups.

Armand et al. discloses a battery electrode ([0058]) comprising a polymer matrix including an acidic non-solvating polymer ([0054]) carrying alkyl sulfur-containing groups ([0054]) that forms a network ([0055]) with other materials enhancing the

mechanical properties of the structure onto which the polymer matrix material is used ([0061], [0108]).

Armand et al. and Callahan et al. are analogous since both deal in the same field of endeavor, namely, polymer materials for electrodes.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the non-solvating polar polymer forming a reinforcing network with other materials as disclosed by Armand et al. into the composition of Callahan et al. to enhance the mechanical properties of the composition and therefore enhance the structure onto which the composition is disposed.

Regarding claim 23, Callahan et al. discloses all of the claim limitations as set forth above but does not disclose the polymer matrix of the ionic conduction material is comprised of an amorphous one-dimensional copolymer or of an amorphous three-dimensional polyether network.

Armand et al. discloses a polymer matrix material comprised of an amorphous one-dimensional copolymer ([0076]). Polyethylene oxide is a one-dimensional copolymer as evidenced by Simon et al. ("Crystallization and Melting Behavior of Polyethylene Oxide Copolymers", Abstract/P82). This material acts to enhance the mechanical properties of the structure onto which the polymer matrix material is used ([0061], [0108])

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the amorphous one-dimensional copolymer of Armand et al.

into the material of Callahan et al. to enhancing the mechanical properties of the structure onto which the polymer matrix material is used.

Regarding claim 36, modified Callahan et al. discloses all of the claim limitations as set forth above but does not disclose the reinforcing agent is brought into contact with the polymer in solution or in the form of a laytex in suspension, or with precursors of the polymer.

Armand et al. discloses a battery electrode ([0058]) comprising a polymer matrix including a polar solvating polymer ([0055]) that forms a network ([0055]) with polymer precursors ([0041]-[0043]) enhancing the mechanical properties of the structure onto which the polymer matrix material is used ([0061], [0108]).

Armand et al. and Callahan et al. are analogous since both deal in the same field of endeavor, namely, polymer materials for electrodes.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the solvating polar polymer forming a reinforcing network polymer precursors as disclosed by Armand et al. into the composition of Callahan et al. to enhance the mechanical properties of the composition and therefore enhance the structure onto which the composition is disposed.

7. Claims 14-17, 19, and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Callahan et al. (US 2002/0010261) in view of Leesona (GB

1,160,084) as applied to claims 1 and 18 above and further in view of Hirakawa et al. (5,281,495).

Regarding claims 14 – 15, and 19, Callahan et al. discloses all of the claim limitations as set forth above and also discloses an insertion material ([0048]), but does not disclose an electronically conductive material in addition to the disclosed insertion material.

Hirakawa et al. discloses a rechargeable battery (Abstract) comprising electrodes with conductive layers in the form of carbon powder (C5/L29-30) and active (insertion) layers (C4/L5-12). The conductive layers help improve cell and cycle characteristics (C3/L55-57).

Hirakawa et al. and Callahan et al. are analogous since both deal in the same field of endeavor, namely, materials used in electrochemical cells.

It would have been obvious to one of ordinary skill in the art at the time of the invention to include carbon powder as a conductive material as disclosed by Hirakawa et al. into the ionic conductive material of Callahan et al. to improve cell and cycle characteristics of the electrical device into which the material is disposed of.

Regarding claim 16, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the insertion material ([0048]) is an oxide manganese ([0048]).

Regarding claim 17, 32 and 33, modified Callahan et al. discloses an electrode for a battery ([0022]), comprisinq a composite material ([0020]), wherein the composite material ([0020]) is a material as set forth above.

Regarding claim 34, modified Callahan et al. discloses an electrode for a fuel cell ([0022]), comprising a composite material ([0020]), wherein the composite material ([0020]) is a material as set forth above.

8. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Callahan et al. (US 2002/0010261) in view of Leesona (GB 1,160,084) as applied to claim 1 above and further in view of Tossici et al. (US 6,087,043).

Regarding claim 24, Callahan et al. discloses all of the claim limitations as set forth above and discloses an electrolyte for a lithium-polymer battery ([0022]), but does not disclose the negative electrode consists of lithiated graphite, and a material as set forth above.

Tossici et al. discloses lithium-polymer battery (Abstract) comprising a negative electrode (“anode”, C4/L12) containing a lithiated graphite (C14/L13-14) and an ionic conductive polymer (C6/L9-10). Batteries containing these electrodes have high energy densities compared to conventional batteries (C1/L54-56).

Tossici et al. and Callahan et al. are analogous since both deal in the same field of endeavor, namely, batteries.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the ionic conductive material of Callahan et al. into a lithiated graphite battery as disclosed by Tossici et al. to impart a high energy density into the battery, enhancing performance.

Regarding claim 25, modified Callahan et al. discloses all of the claim limitations as set forth above but does not disclose the matrix of the ionic conduction polymer is comprised of a homo- or copolymer of vinylidene fluoride, acrylonitrile, methacrylonitrile, alkyl acrylate, alkyl methacrylate or ethylene oxide.

Tossici et al. discloses an ionic conductive polymer binder, vinylidene fluoride (C6/L9-10), is used in an electrode. This material binds the active material to a substrate (C6/L11-14). Batteries containing these electrodes have high energy densities compared to conventional batteries (C1/L54-56).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate vinylidene fluoride as a binder as disclosed by Tossici et al. into the material of Callahan et al. to bind the active material to the electrode and impart a high energy density into the battery.

9. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Callahan et al. (US 2002/0010261) in view of Leesona (GB 1,160,084) as applied to claim 1 above and further in view of Skotheim (US 4,442,185).

Regarding claim 29, Callahan et al. discloses all of the claim limitations as set forth above and that the ionic conductive material can be used in a variety of electrochemical devices ([0003]), but does not explicitly disclose a solar cell comprising a photoanode and a cathode separated by electrolyte, the photoanode carrying a conductive glass, wherein the electrolyte is comprised of_an ionic conduction material as set forth above.

Skotheim discloses in Fig 1, a solar cell (Abstract) comprising a photoanode (ref 5) and a cathode (ref 6) separated by electrolyte (ref 3), the photoanode carrying a conductive glass (C16/L21-22), wherein the electrolyte (ref 3) is comprised of ionic polymer matrix material (C14/L31-32) containing cellulose (C14/L64).

Skotheim and Callahan et al. are analogous since both deal in the same field of endeavor, namely, electrochemical cells.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the ionic conductive material of Callahan et al. into a solar cell as disclosed by Skotheim to generate electrochemical energy to power electrical devices.

10. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Callahan et al. (US 2002/0010261) in view of Leesona (GB 1,160,084) as applied to claim 1 above and further in view of Niu (US 6,205,016).

Regarding claim 30, Callahan et al. discloses all of the claim limitations as set forth above and that the ionic conductive material can be used in a variety of electrochemical devices ([0003]), but does not explicitly disclose a supercapacitor comprised of an

electrochemical cell comprising two electrodes separated by an electrolyte, wherein the electrolyte is an ionic conduction material as set forth above in which the ionic compound is a lithium or tetraalkylammonium salt, or an acid.

Niu discloses supercapacitor (C3/L36) comprised of an electrochemical cell (C9/L37-38) comprising two electrodes separated by an electrolyte (C9/39/40), wherein the electrolyte is an ionic ionic polymer matrix material (C17/L16-17) in which the ionic compound is a lithium or tetraalkylammonium salt (C9/L42), or an acid.

Niu and Callahan et al. are analogous since both deal in the same field of endeavor, namely, electrochemical cells.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the ionic conductive material of Callahan et al. into a supercapacitor as disclosed by Niu to generate electrochemical energy to power electrical devices.

Response to Arguments

11. Applicant's arguments with respect to claims 1, 3-7 and 9-36 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KENNETH DOUYETTE whose telephone number is

(571)270-1212. The examiner can normally be reached on Monday - Thursday 6am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley can be reached on (571) 272-1453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. D./
Examiner, Art Unit 1725

/Jonathan Crepeau/
Primary Examiner, Art Unit 1725